REMARKS

Claims 1-19 were pending in the subject application. By this Amendment, claim 1 has been canceled, new independent claim 20 has been added, and claims 2, 4, 7, 10 and 19 which formerly depended from claim 1 (now canceled) have been amended to correct their respective claim dependencies. Accordingly, claims 2-20 are now pending, with claim 20 being the sole pending claim in independent form.

Rejection under 35 U.S.C. §112, second paragraph

On page 2 of the June 23, 2005 Office Action, claims 1-19 were rejected under 35 U.S.C. §112, second paragraph, as allegedly indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The Examiner stated that Applicant's claims are confusing as to intent because it can not be determined if the processes as claimed, defined by the language "...is enabled to be formed without ...", are inclusive of methods of preparation including cell-opening operations.

By this Amendment, claim 1 has been canceled, and new independent claim 20 has been added.

Applicant respectfully submits that the amended claims clearly recite the subject matter Applicant regards to be the invention. Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection of claims 1-19 under 35 U.S.C. §112, second paragraph.

Rejection Under 35 U.S.C. §102(b)

On page 2 of the June 23, 2005 Office Action, claims 1-19 were rejected under 35 U.S.C. §102(b) as purportedly anticipated by U.S. Patent No. 4,264,743 to Maruyama et al.

The Examiner stated that Maruyama discloses preparations of flexible open-celled polyurethanes having low-air permeability and being formed from feedstock including polyols, isocyanates, catalysts, foaming agents, oxyalkylene-siloxane foam stabilizers, and hydrocarbon fluid compounds which read on the processes and products claimed.

Applicant maintains that the claimed invention cannot be anticipated by Maruyama because the cited reference fails to disclose each and every element of the claimed invention.

The present application relates to a low air-permeability flexible polyurethane foam block which can be used as, for example, a cushioning material, a sound absorbing material, an air-sealing material, a water sealing material, etc.

Conventional methods of manufacturing a flexible polyurethane foam block involve mixing together polyol, an isocyanate compound, a foaming agent, and other essential components to permit a polymerization reaction to be proceeded, thereby generating a gas. The gas generated from the reaction between the foaming agent or isocyanate and water is turned into fine bubbles to thereby form the urethane foam block, during which a step of destroying the membrane of cells in the urethane foam block must take place in order to enable the cells to intercommunicate with each other.

The step of destroying the membrane of cells is called "healthy bubble", "blow off" or "the opening cell". In this step, gas pressure inside the foam is permitted to exceed above the strength of the cell membrane at the moment when the height of the foam being produced reaches maximum, thereby destroying the cell membrane and enabling the cells to intercommunicate with each other. This high-pressure gas is subsequently permitted to be locally ejected out through the top surface of the foam block. The prior art considers this step of destroying the membrane of cells to be an indispensable step in the manufacture of a flexible polyurethane foam block.

The term "healthy bubble" is employed in the present application to denote also a gas to be locally ejected at the moment when the height of the foam being produced reaches maximum. The circumstances of healthy bubble are described in various authoritative publications related to urethane. Healthy bubble is generated on the occasion of manufacturing a flexible polyurethane foam block by a person skilled in the art. Namely, the prior art suggest that healthy bubble is an indispensable open-cell-forming (intercommunicating) step in the manufacture of a flexible polyurethane foam block. Thus, as represented by the term "healthy bubble", it has been considered for a long period of time that the conditions where healthy bubble generates are assumed to be an optimum state in the manufacture of flexible polyurethane foam blocks.

For example, as disclosed in U.S. Patent No. 5,219,893 (column 5, lines 59-68), U.S. Patent No. 5,011,908 (column 14. line 25-27). US 5,219,892 (column 4, lines 36-40), and U.S. Patent No. 6,184.262 (column 5, lines 5-8), it is acknowledged that the state in which the "healthy bubble" or "blow off" or "blow out"

is generated is an optimum state in the manufacture of flexible polyurethane foam. Further, in a diagram of a recent study regarding a cell-opening mechanism until formation of flexible polyurethane foam, the foam is cell-opened by a locally ejected gas ("blow off") produced when the height of the foam reaches maximum (R.B. Turner et al., Advances in Urethane Sci & Tech., (1992) 11, p.58).

As described above, it has been considered in the prior art for a long period of time that the "opening of the cells step called healthy bubble" is an indispensable step accompanying manufacture of a flexible polyurethane foam block.

The claimed invention of the present application (for example, claim 20) is directed to a method of manufacturing a low air-permeability flexible polyurethane foam block through an employment of at least polyol, an isocyanate compound, a catalyst, a foaming agent and a foam stabilizer. An open-cell flexible polyurethane foam block having an air-permeability of not more than 5cc/cm^2/sec and a variation of air-permeability throughout the entire body thereof is confined to not more than 1cc/cm^2/sec is enabled to be formed without accompanying an opening of the cells step called healthy bubble. Thus, an open-cell flexible polyurethane foam block having low air-permeability, which is substantially free from portion-dependent variation of air-permeability, even in a large foam block having extremely low air-permeability, can be produced.

Maruyama, as understood by Applicant, discloses a polyurethane foam sealing member and a manufacturing method thereof, wherein the thickness is 10 mm and the air-permeability is no more than 100 cc/cm^2/sec.

Applicant does not find teaching or suggestion in the cited art, however, of a method of manufacturing a low air-permeability flexible polyurethane foam block through an employment of at least polyol, an isocyanate compound, a catalyst, a foaming agent and a foam stabilizer, wherein an open-cell flexible polyurethane foam block having an air-permeability of not more than 5cc/cm^2/sec and a variation of air-permeability throughout the entire body thereof is confined to not more than 1cc/cm^2/sec is enabled to be formed without accompanying an opening of the cells step called healthy bubble, as provided by claim 20 of the present application.

Regarding claims 2-19, Applicant respectfully points out that claims 2-19 depend on and include all the limitations of claim 20. Therefore, claims 2-19 are patentable at least for the reasons set forth above with respect to claim 20.

Since claim 1 has been canceled hereinabove, the rejection with regard to claim 1 is now moot.

Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection of claims 1-19 under 35 U.S.C. §102(b).

Rejection Under 35 U.S.C. §102(e)

On page 3 of the June 23, 2005 Office Action, claims 1-9 and 19 were rejected under 35 U.S.C. §102(e) as purportedly anticipated by U.S. Patent No. 6,034,148 to Kelly et al. (hereinafter "Kelly '148").

The Examiner stated that Kelly '148 discloses preparations of

flexible open-celled polyurethanes having low-air permeability and being formed from feedstock including polyols, isocyanates, catalysts, foaming agents, oxyalkylene-siloxane foam stabilizers, and additives which read on the processes and products claimed.

Applicant maintains that the claimed invention cannot be anticipated by Kelly '148 because the cited reference fails to disclose each and every element of the claimed invention.

Kelly '148, as understood by Applicant, discloses a method for manufacturing an energy-absorbing polyurethane foam using graft polyols, water, surfactants and catalysts.

Applicant does not find teaching or suggestion in the cited art, however, of a method of manufacturing a low air-permeability flexible polyurethane foam block through an employment of at least polyol, an isocyanate compound, a catalyst, a foaming agent and a foam stabilizer, wherein an open-cell flexible polyurethane foam block having an air-permeability of not more than 5cc/cm^2/sec and a variation of air-permeability throughout the entire body thereof is confined to not more than 1cc/cm^2/sec is enabled to be formed without accompanying an opening of the cells step called healthy bubble, as provided by claim 20 of the present application.

Regarding claims 2-9, Applicant respectfully points out that claims 2-9 depend on and include all the limitations of claim 20. Therefore, claims 2-9 are patentable at least for the reasons set forth above with respect to claim 20.

Since claim 1 has been canceled hereinabove, the rejection with regard to claim 1 is now moot.

Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection of claims 2-9 and 19 under 35 U.S.C. §102(e).

Rejection Under 35 U.S.C. §102(e)

On page 3 of the June 23, 2005 Office Action, claims 1-9 and 19 were rejected under 35 U.S.C. §102(e) as purportedly anticipated by U.S. Patent No. 6,747,068 to Kelly (hereinafter "Kelly '068").

The Examiner stated that Kelly '068 discloses preparations of flexible open-celled polyurethanes having low-air permeability and being formed from feedstock including polyols, isocyanates, catalysts, foaming agents, oxyalkylene-siloxane foam stabilizers, and additives which read on the processes and products claimed.

Applicant maintains that the claimed invention cannot be anticipated by Kelly '068 because the cited reference fails to disclose each and every element of the claimed invention.

Kelly '068, as understood by Applicant, discloses a hydrophobic polyurethane foam manufactured from a conventional PO/EO polyether polyol, graft polyol and hydrophobicity including surfactant.

Applicant does not find teaching or suggestion in the cited art, however, of a method of manufacturing a low air-permeability flexible polyurethane foam block through an employment of at least polyol, an isocyanate compound, a catalyst, a foaming agent and a foam stabilizer, wherein an open-cell flexible polyurethane foam block having an air-permeability of not more than $5cc/cm^2/sec$ and a variation of air-permeability throughout the

entire body thereof is confined to not more than 1cc/cm^2/sec is enabled to be formed without accompanying an opening of the cells step called healthy bubble, as provided by claim 20 of the present application.

Regarding claims 2-9, Applicant respectfully points out that claims 2-9 depend on and include all the limitations of claim 20. Therefore, claims 2-9 are patentable at least for the reasons set forth above with respect to claim 20.

Since claim 1 has been canceled hereinabove, the rejection with regard to claim 1 is now moot.

Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection of claims 2-9 and 19 under 35 U.S.C. §102(e).

Rejection Under 35 U.S.C. §102(b)

On page 4 of the June 23, 2005 Office Action, claims 1-9 and 19 were rejected under 35 U.S.C. §102(b) as purportedly anticipated by U.S. Patent No. 5,550,169 to Yata et al.

The Examiner stated that Yata discloses preparations of flexible open-celled polyurethanes having low-air permeability and being formed from feedstock including polyols, isocyanates, catalysts, foaming agents, oxyalkylene-siloxane foam stabilizers, and additives which read on the processes and products claimed.

Applicant maintains that the claimed invention cannot be anticipated by Yata because the cited reference fails to disclose each and every element of the claimed invention.

Yata, as understood by Applicant, discloses a method for manufacturing a flexible or semi-rigid polyurethane foam from a mixture including a polyhydroxyl compound, isocyanate, blowing agent, catalyst and a foam stabilizer.

Applicant does not find teaching or suggestion in the cited art, however, of a method of manufacturing a low air-permeability flexible polyurethane foam block through an employment of at least polyol, an isocyanate compound, a catalyst, a foaming agent and a foam stabilizer, wherein an open-cell flexible polyurethane foam block having an air-permeability of not more than 5cc/cm^2/sec and a variation of air-permeability throughout the entire body thereof is confined to not more than 1cc/cm^2/sec is enabled to be formed without accompanying an opening of the cells step called healthy bubble, as provided by claim 20 of the present application.

Regarding claims 2-9, Applicant respectfully points out that claims 2-9 depend on and include all the limitations of claim 20. Therefore, claims 2-9 are patentable at least for the reasons set forth above with respect to claim 20.

Since claim 1 has been canceled hereinabove, the rejection with regard to claim 1 is now moot.

Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection of claims 2-9 and 19 under 35 U.S.C. §102(b).

Rejection Under 35 U.S.C. §102(b)

On page 4 of the June 23, 2005 Office Action, claims 1-9 and 19

were rejected under 35 U.S.C. §102(b) as purportedly anticipated by each of Japanese Patent Publication No. JP-7188644 (hereinafter JP '644"), Japanese Patent Publication No. JP3068677 (hereinafter JP '677"), Japanese Patent Publication No. JP57031976 (hereinafter JP '976"), Japanese Patent Publication No. JP57102978 (hereinafter JP '978"), Japanese Patent Publication No. JP9053061 (hereinafter JP '061"), Japanese Patent Publication No. JP8092404 (hereinafter JP '404")and European Patent Publication No. EP0806442 (hereinafter EP '442").

The Examiner stated that JP '644, JP '677, JP '976, JP '978, JP '061, JP '404 and EP '422, each taken individually, disclose preparations of flexible open-celled polyurethanes having low-air permeability and being formed from feedstock including polyols, isocyanates, catalysts, foaming agents, oxyalkylene-siloxane foam stabilizers, and additives which read on the processes and products claimed.

Applicant maintains that the claimed invention cannot be anticipated by JP '644, JP '677, JP '976, JP '978, JP '061, JP '404 and EP '422 because the cited art fails to disclose each and every element of the claimed invention.

JP '644, as understood by Applicant, relates to a manufacturing method of a flexible or semi-rigid open-celled polyurethane foam sealing material. JP '644 discloses using a low reactive silicon foam stabilizer, which has a group that reacts with isocyanate or polyol and has a slower reaction than a hydroxyl group, as a foam stabilizer, and the air-permeability is no more than 20 $cc/cm^2/sec$ at a thickness of 10 mm.

JP '677, as understood by Applicant, relates to a manufacturing

method of a polyurethane foam sealing material. JP '677 discloses using an organosilicon compound having a predetermined general formula as a foam stabilizer, and the air-permeability is 20 $cc/cm^2/sec$ at a thickness of 10 mm.

JP '976, as understood by Applicant, relates to a manufacturing method of a polyurethane foam sealing material. JP '976 discloses carrying out open-cell forming to provide an air-permeability of no more than 10 $cc/cm^2/sec$ by crushing after a foaming reaction.

JP '978, as understood by Applicant, relates to a manufacturing method of a polyurethane foam sealing material. JP '978 discloses using an organosilicon compound as a foam stabilizer, and the air-permeability is approximately 100 $cc/cm^2/sec$ at a thickness of 10 mm.

JP '061, as understood by Applicant, relates to a manufacturing method of a flexible polyurethane foam sealing material. JP '061 discloses using an organosilicon compound for rigid polyurethane open-cell forming, having an OR group in a terminal end, as a foam stabilizer, and the air-permeability is 20 $cc/cm^2/sec$ at a thickness of 10 mm.

JP '404, as understood by Applicant, relates to a manufacturing method of a flexible polyurethane foam sealing material, and discloses using a polysiloxane-polyoxyalkylene copolymer as a foam stabilizer.

EP '422, as understood by Applicant, discloses a flexible polyurethane foam obtained by reacting a composition formed of polyisocyanate and polyol having predetermined structures.

Applicant does not find teaching or suggestion in the cited art, however, of a method of manufacturing a low air-permeability flexible polyurethane foam block through an employment of at least polyol, an isocyanate compound, a catalyst, a foaming agent and a foam stabilizer, wherein an open-cell flexible polyurethane foam block having an air-permeability of not more than 5cc/cm^2/sec and a variation of air-permeability throughout the entire body thereof is confined to not more than 1cc/cm^2/sec is enabled to be formed without accompanying an opening of the cells step called healthy bubble, as provided by claim 20 of the present application.

Regarding claims 2-9, Applicant respectfully points out that claims 2-9 depend on and include all the limitations of claim 20. Therefore, claims 2-9 are patentable at least for the reasons set forth above with respect to claim 20.

Since claim 1 has been canceled hereinabove, the rejection with regard to claim 1 is now moot.

Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection of claims 2-9 and 19 under 35 U.S.C. §102(b).

Rejection Under 35 U.S.C. §103(a)

On page 5 of the June 23, 2005 Office Action, claims 10-18 were rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Kelly '148, Kelly '068, Yata, JP '644, JP '677, JP '976, JP '978, JP '061, JP '404 and EP '422 ("Primary Reference"), each taken individually in view of Maruyama.

The Examiner acknowledged that each Primary Reference differs from the claims in that the hydrocarbon compound claimed is not particularly recited as an additive.

The Examiner stated that Maruyama teaches the employment of these materials in polyurethane synthesis for the purpose of improving imperviousness and waterproofing of articles formed.

The Examiner alleged that it would have been obvious for one having ordinary skill in the art to have employed the hydrocarbon compounds of Maruyama in the preparation of the open-celled polyurethane of each Primary Reference for the purpose of imparting its permeability reducing effect in order to arrive at the processes of applicant's claims with the expectation of success in the absence of a showing of new or unexpected results.

Applicant maintains that the cited art does not render obvious the invention claimed in claims 10-18. The claimed invention is patentable over the cited art for at least the following reasons.

When the gas generated through a manufacturing step of a flexible polyurethane foam block is entrapped inside the foam until the foaming process is finished, and then, the gas is permitted to eject out of the ceils at a stroke by way of the opening of the cells step called healthy bubble so as to enable the cells to intercommunicate with each other, the quantity of gas passing though the region of foam block extending from the middle portion to the upper portion thereof increases gradually, whereby the openings to be formed in the cell membranes would become proportionally larger (or increase in number), thus resulting in the enhancement of air-permeability as compared with other lower portion in the foam block. Therefore, in the entire foam, there

were variations in air-permeability ranging from 2cc/cm^2/sec to 15cc/cm^2/sec depending on the upper, middle and lower regions of the foam block, or depending on the sidewall and center portion of the foam block (see application at page 23, line 18 through page 24, line 4, and page 2, line 22 through page 3, line 13).

As described above, the foam block obtained by a manufacturing method accompanying a prior "opening of the cells step called healthy bubble" has variations in air-permeability of 2-15cc/cm^2/sec. Therefore, the foam having a desired low air-permeability can only be obtained at a lower portion, or at middle and lower portions, and there was much waste (see application at page 3, lines 14-20).

Applicant has considered that if an open-cell flexible polyurethane foam block can be manufactured without accompanying an opening of the cells step called healthy bubble, it may be possible to obtain an open-cell polyurethane foam block which is substantially free from variations in air-permeability throughout the entire body thereof (see application at page 6, lines 2-8 of the English specification). As described above, for the first time, a low air-permeability flexible polyurethane foam block in which there is hardly any variation of air-permeability from one site to another, that is, which has variation (maximum-minimum air-permeability depending on the portion of the foam block) in air-permeability of no more than 1cc/cm^2/sec can be obtained by the manufacturing method of the present application which does not accompany an opening of the cells step called healthy bubble.

The flexible polyurethane foam block is divided into an upper section, middle section and lower section in the vertical direction (thickness direction), and each of these sections is

divided into a central section and end sections. Thus, the relationship between the location in the block and the air-permeability was examined, and the results were summarized in reference figure A attached hereto as **Exhibit 1**.

As can be understood from Figure A, in conventional products A, B, C and D (which are foam blocks each manufactured by a method accompanying an opening of cells step called healthy bubble), the air-permeability increases as the level of the location is higher. This is because the gas generated in the lower section moves up to the upper surface of the foam block by the cell-opening step, and during this process, the degree of the burst of the cell membrane is higher as the cells are located in an upper section in the foam block.

For example, in conventional products, the end sections of the upper section and the central section of the upper section have overwhelmingly higher air-permeability values. On the other hand, the end section of the lower section and the central section of the lower section have relatively lower air-permeability values. Thus, in the conventional products, the air-permeability significantly varies from one site to another in the foam block. By contrast, in the case of the present application, the air-permeability is measured to be extremely low and substantially free from variations of the position in the foam block or no matter where the measurement is carried out.

As discussed in the specification of the present application, there is a demand for a method of manufacturing a low air-permeability polyurethane block having a variation in air-permeability from one site to another in the foam block of 1cc/cm^2/sec or even lower (see application at page 3. lines 20-

24). In order to respond to such a demand, the present application provided a low air-permeability polyurethane foam block having an extremely low air-permeability and substantially free from dispersion in air-permeability from one site to another in the foam block if the block is made in a large size, that is, a flexible polyurethane foam block having a dispersion in air-permeability of 1cc/cm^2/sec or even lower, as well as a method of manufacturing such a foam block. As described in the sections of "Background Art" and "Table 1" and "Table 2" of the specification of the present application, the conventional products (each of which is a foam block manufactured by a method accompanied by a cell-opening step called healthy bubble) exhibits a dispersion in air-permeability of 2 to 15 cc/cm^2/sec from one site to another. By contrast, the present application can provide a flexible polyurethane foam block having a dispersion in air-permeability of 1cc/cm^2/sec or even lower.

As clear from reference figure A, a foam block having a difference in air-permeability of 1cc/cm^2/sec from one site to another cannot be obtained with the manufacturing method accompanying the conventional "opening of the cells step called healthy bubble".

Applicant simply does not find teaching or suggestion in the cited art of a method of manufacturing a low air-permeability flexible polyurethane foam block through an employment of at least polyol, an isocyanate compound, a catalyst, a foaming agent and a foam stabilizer, wherein an open-cell flexible polyurethane foam block having an air-permeability of not more than 5cc/cm^2/sec and a variation of air-permeability throughout the entire body thereof is confined to not more than 1cc/cm^2/sec is enabled to be formed without accompanying an opening of the cells

step called healthy bubble, as provided by claim 20 of the present application.

Therefore, even a combination of the cited references in the manner suggested by the Examiner fails to teach or render obvious all features of the claimed invention.

Regarding claims 10-18, Applicant respectfully points out that claims 10-18 depend on and include all the limitations of claim 20. Thus, claims 10-18 are patentable at least for the reasons set forth above with respect to claim 20.

Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw the rejection of claims 10-18 under 35 U.S.C. §103.

In view of the amendments to the claims and remarks hereinabove, Applicant maintains that claims 2-20 are now in condition for allowance. Accordingly, Applicant earnestly solicits the allowance of the application.

If a telephone interview would be of assistance in advancing prosecution of the subject application, Applicant's undersigned attorney invites the Examiner to telephone him at the telephone number provided below.

If a petition for an extension of time is required to make this response timely, this paper should be considered to be such a petition, and the Commissioner is authorized to charge the requisite fees to our Deposit Account No. 03-3125.

No fee is deemed necessary in connection with the filing of this Amendment. However, if any additional fee is required, authorization is hereby given to charge the amount of any such fee to Deposit Account No. 03-3125.

Respectfully submitted,

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I hereby certify that this correspondence is being deposited this date with the U.S. Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

September 19, 2005
Date

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